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EXAMINER
TSAI, SHENG JEN

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DATE MAILED: 09/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>13 February 2004</u>.
2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-26</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-9 and 11-26</u> is/are rejected.
7)☒ Claim(s) <u>10</u> is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date <u>02/13/2004</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-26 are presented for examination in this application (10,779,542) filed

on February 13, 2004.

Acknowledge is made of information disclosure document filed on 02/13/2004.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by
another filed in the United States before the invention by the applicant for patent or (2) a patent
granted on an application for patent by another filed in the United States before the invention by the
applicant for patent, except that an international application filed under the treaty defined in section
351(a) shall have the effects for purposes of this subsection of an application filed in the United States
only if the international application designated the United States and was published under Article 21(2)
of such treaty in the English language.

2.   Claims 1-4, 7-9, 15-20 and 22-26 are rejected under 35 U.S.C. 102(e) as being

anticipated by Idei et al. (U.S. Patent Application Publication 2003/0177330).

As to claim 1, Idei et al. disclose **a signal bearing medium tangibly embodying**

a program of machine-readable instructions [figures 5-6 and 10-11] **executable by**

a digital processing apparatus [the management server, figure 1, 100] **to perform**

operations for restoring data [to read-out data from the storage devices (figure 1,

110) and retrieve it to the servers (figure 1, 120); step 504 of figure 5], **the operations**

comprising:

receiving a request for at least a portion of the data [based on a request from each

server 120, performing a data write-in/data read-out into/from a designated physical

storage area (paragraph 0029)];

creating a directory entry for the data in a virtual file system [figure 2 shows the

directory entry of the data (virtual volume information for each of the virtual volume);

figure 3 shows the read-out history information and access history information

regarding each entry of the virtual volume];

allocating storage space for the data [this is <u>inherent</u> for the data retrieve process as

the retrieved data must be stored somewhere];

initializing a block virtualization indicator to a value indicating that the data is

not available [The management server 100 retrieves the readahead history

information 320 from the present point-in-time to a predetermined time-period ago,

thereby checking <u>whether or not the data that becomes the read-out target this time</u>

<u>has been already read out onto the caches</u> 114 in the storage devices 110 by a

previous readahead processing (paragraph 0054; step 508, figure 5); If the data that

becomes the read-out target this time has been already read out onto the caches 114,

the server 100 continues the processing from the step 518. If not, the server 100

continues the processing from step 512 (paragraph 0055; step 510, figure 5)].

writing a subset of the data to the storage space [steps 514 and 522 of figure 5];

and

changing the block virtualization indicator to a value indicating that the data is

available [The management server 100 retrieves the readahead history information

320 from the present point-in-time to a predetermined time-period ago, thereby

checking <u>whether or not the data that becomes the read-out target this time has been</u>

<u>already read out onto the caches</u> 114 in the storage devices 110 by a previous

readahead processing (paragraph 0054; step 508, figure 5); If the data that becomes

the read-out target this time has been already read out onto the caches 114, the server

100 continues the processing from the step 518. If not, the server 100 continues the

processing from step 512 (paragraph 0055; step 510, figure 5)].

As to claim 2, Idei et al. teach that **the signal bearing medium of claim 1,**

wherein the operations further comprise writing an additional subset of the data

to the storage space [If the data access is judged to be <u>the portion of the read-out of</u>

<u>the consecutive data</u>, the control device 105 in the management server 100 acquires

the physical addresses corresponding to virtual blocks where there exists a fixed

amount of data that follows the data to be read out this time (paragraph 0033)].

As to claim 3, Idei et al. teach that **the signal bearing medium of claim 1,**

wherein the operations further comprise identifying portions of the data that

have not been written to the storage space [The management server 100 retrieves

the readahead history information 320 from the present point-in-time to a

predetermined time-period ago, thereby checking <u>whether or not the data that</u>

<u>becomes the read-out target this time has been already read out onto the caches</u> 114

in the storage devices 110 by a previous readahead processing (paragraph 0054; step

508, figure 5); If the data that becomes the read-out target this time has been already

read out onto the caches 114, the server 100 continues the processing from the step

518. If not, the server 100 continues the processing from step 512 (paragraph 0055;

step 510, figure 5)].

As to claim 4, Idei et al. teach that **the signal bearing medium of claim 1,**

wherein the operations further comprise:

receiving a request for a part of the data that at least partially is not written to the

storage space [The management server 100 retrieves the readahead history

information 320 from the present point-in-time to a predetermined time-period ago,

thereby checking <u>whether or not the data that becomes the read-out target this time</u>

<u>has been already read out onto the caches</u> 114 in the storage devices 110 by a

previous readahead processing (paragraph 0054; step 508, figure 5); If the data that

becomes the read-out target this time has been already read out onto the caches 114,

the server 100 continues the processing from the step 518. If not, the server 100

continues the processing from step 512 (paragraph 0055; step 510, figure 5)].;

retrieving and writing to the storage space the requested part of the data that is

not written to the storage space [steps 514 and 522 of figure 5]; **and**

responding to the request for the part of the data [figure 5]

As to claim 7, Idei et al. teach that **the signal bearing medium of claim 4,**

wherein the operations further comprise retrieving an additional subset of the

data, starting at a location sequentially after the retrieved data [If the data access

is judged to be <u>the portion of the read-out of the consecutive data</u>, the control device

105 in the management server 100 acquires the physical addresses corresponding to

virtual blocks where there exists a fixed amount of data that follows the data to be read

out this time (paragraph 0033)].

As to claim 8, Idei et al. teach that **the signal bearing medium of claim 4,**

wherein the operations further comprise retrieving an additional subset of the

data, starting at a location wherein data is expected to be requested next [the

case where the control device 105 <u>predicts</u> that the data read-out request from the

server 120 will be a portion of a read-out request for <u>consecutive data</u> (paragraph

0049)].

As to claim 9, Idei et al. teach that **the signal bearing medium of claim 4,**

wherein the operations further comprise retrieving an additional subset of the

data, starting at a randomly selected location [step 604 of figure 6 checks if the

data read-out request is for consecutive data or not (i.e., non-consecutive random

location)].

As to claim 15, Idei et al. teach that **the signal bearing medium of claim 1,**

wherein the operation of creating a directory entry [figure 2 shows the directory

entry of the data (virtual volume information for each of the virtual volume); figure 3

shows the read-out history information and access history information regarding each

entry of the virtual volume] **further comprises creating a pointer for the data in the**

virtual file system [the virtual volume information shown in figure 2 provides the virtual

block address, storage device Ids, logical unit numbers and logical block address

information that serve as pointers to related storage space; the read-out history

information and readhead history information provide head virtual block address and

bottom virtual block address information, which also serve as pointers to related

storage space].

As to claim 16, Idei et al. teach that **the signal bearing medium of claim 1,**

wherein the data is restored from tape [The mainstream structure of a storage

device is now a structure where a magnetic disk circular-plate is used as the recording

medium (paragraph 0007)].

As to claim 17, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 18, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 19, Idei et al. disclose **a computer system** [figure 1], **comprising**:

a memory [memory, figure 1, 108 and 117]; **and**

a processing device [the management server, figure 1, 100] **coupled to the**

memory [memory, figure 1, 108)], **wherein the processing device is programmed**

to perform operations for restoring data [to read-out data from the storage devices

(figure 1, 110) and retrieve it to the servers (figure 1, 120); step 504 of figure 5], the

operations comprising:

receiving a request for at least a portion of the data [based on a <u>request</u> from each

server 120, performing a data write-in/<u>data read-out</u> into/from a designated physical

storage area (paragraph 0029)];

creating a directory entry for the data in a virtual file system [figure 2 shows the

directory entry of the data (virtual volume information for each of the virtual volume);

figure 3 shows the read-out history information and access history information

regarding each entry of the virtual volume];

allocating storage space for the data [this is <u>inherent</u> for the data retrieve process as

the retrieved data must be stored somewhere];

initializing a block virtualization indicator to a value indicating that the data is

not available [The management server 100 retrieves the readahead history

information 320 from the present point-in-time to a predetermined time-period ago,

thereby checking <u>whether or not the data that becomes the read-out target this time</u>

<u>has been already read out onto the caches</u> 114 in the storage devices 110 by a

previous readahead processing (paragraph 0054; step 508, figure 5); If the data that

becomes the read-out target this time has been already read out onto the caches 114,

the server 100 continues the processing from the step 518. If not, the server 100

continues the processing from step 512 (paragraph 0055; step 510, figure 5)].

writing a subset of the data to the storage space [steps 514 and 522 of figure 5];

and

changing the block virtualization indicator to a value indicating that the

data is available [The management server 100 retrieves the readahead history

information 320 from the present point-in-time to a predetermined time-period ago,

thereby checking <u>whether or not the data that becomes the read-out target this time has</u>

<u>been already read out onto the caches</u> 114 in the storage devices 110 by a previous

readahead processing (paragraph 0054; step 508, figure 5); If the data that becomes

the read-out target this time has been already read out onto the caches 114, the server

100 continues the processing from the step 518. If not, the server 100 continues the

processing from step 512 (paragraph 0055; step 510, figure 5)].

As to claim 20, Idei et al. teach that **the computing system of claim 19,**

wherein the memory and the processing device are part of a host, and further

comprising:

a file virtualization meta data server coupled to the host [Moreover, the storage

capacity of the storage device itself, and the number of storage devices, <u>file servers</u>, or

the like which are to be connected to a SAN (Storage Area Network)(paragraph 0002)];

and

a storage virtualization engine SAN volume controller coupled to the host [the

SAN (paragraph 0002; figure 1, 130 and 132)].

As to claim 22, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 23, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 24, refer to "As to claim 3" presented earlier in this Office Action.

As to claim 25, refer to "As to claim 4" presented earlier in this Office Action.

As to claim 26, Idei et al. teach that **the method of claim 23, wherein the**

operations further comprise associating with the data, metadata indicating

access characteristics of blocks of the data [for example, the storage device

information provides the access characteristics information of "cache sizes"].

Claim Rejections - 35 USC § 103

3.　　The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.　　Claims 11-14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Idei et al. (U.S. Patent Application Publication 2003/0177330), and in view of

Murray et al. (U.S. 7,007,048).

As to claim 11, Idei et al. do not mention that **the operations further comprise backing up the data**.

However, it is well known in the art that the operations of "backing-up data" and "restoring data" are the two components commonly used in a storage system to provide redundancy, reliability and availability of the storage system.

Further, Murray et al. teach in their invention "System for Information life Cycle management Model for Data Migration and Replication" a system where a SAN is employed to perform operations such as disk mirroring, data backup, data restoration, data archival, data retrieval, data migration between storage devices, and data sharing (column 1, lines 19-21; column 7, lines 61-63).

Therefore it would have been obvious for persons of ordinary skills in the art at the time of the applicant's invention to recognize the "backing-up data" operation is well known in the art and commonly adopted to complement the "restoring data" operation to provide redundancy, reliability and availability of the storage system, as demonstrated by Murray et al., hence lacking patentable significance.

As to claim 12, Idei et al. teach that **the signal bearing medium of claim 11, wherein the operation of backing up the data comprises storing information identifying the storage locations of each of a plurality of blocks of the data** [figures 2-4].

As to claim 13, Murray et al. teach that **the signal bearing medium of claim 11, wherein the operation of backing up the data further comprises storing metadata including access characteristics of blocks of the data, with the data** [File system

metadata services provide the basis for a universal access method for user files on

HFS SAN subsystems 22, independent of the underlying file system format. For a

given a hostname, LUN 50 and filename, the Storage API will contact the ILM Shim on

this host 46 to obtain the logical block numbers comprising the given file on the

specified LUN 50. When forwarded by ILM Controller 54 to ILM Head 60 on

corresponding HFS SAN subsystem 22, this metadata can then be used as a virtual

"file name" for point to point file transfer operations (column 7, lines 49-57)].

As to claim 14, Idei et al. teach that **the signal bearing medium of claim 11,**

wherein the operations further comprise associating with the data, metadata

indicating access characteristics of blocks of the data [for example, the storage

device information provides the access characteristics information of "cache sizes"].

As to claim 21, Murray et al. teach that the computing system of claim 20, further

comprising a disk device and a backup device coupled to the storage virtualization

engine SAN volume controller [column 5, lines 31-47; column 1, lines 19-21; column 7,

lines 61-63].

5.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Idei et al.

(U.S. Patent Application Publication 2003/0177330), and in view of Matsuda et al. (U.S.

7,020,668).

As to claim 5, Idei et al. do not mention that **the signal bearing medium of**

claim 4, wherein the requested part of the data that is not written to the storage

space is retrieved on a priority basis.

However, Matsuda et al. teach in the invention "Device for Retaining Important Data on a Preferential Basis" a system where data files in a storage device are ranked in the ascending order of importance for storing purpose in a networked storage environment [abstract; figures 3-4, 6-7 and 10].

Retrieving data on a priority basis allows data of higher importance to be restored first in a timely manner, and also allows better management of the capacity of the storage system [Matsuda et al., column 1, lines 40-54].

Therefore it would have been obvious for persons of ordinary skills in the art at the time of the applicant's invention to recognize the benefits of retrieving the data on a priority basis, as demonstrated by Matsuda et al., and to incorporate it into the existing method disclosed by Idei et al. to further improve the performance of the system.

6.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Idei et al. (U.S. Patent Application Publication 2003/0177330), and in view of Lo et al. (U.S. Patent Application Publication 2002/0103943).

As to claim 6, Idei et al. do not mention that **the signal bearing medium of claim 4, wherein the operations further comprise indicating a busy condition**.

However, it is well known in the art and a common practice to provide busy/idle status signal to facilitate communications between the source and destination entities of a data transfer pair.

Further, Lo et al. teach in the invention "Distributed Storage management Platform Architecture" a SAN virtualization storage system where a busy status signal is

provided to indicate if a storage device is able to response to the data retrieving

requests [paragraphs 0371 and 0374-0375].

Therefore it would have been obvious for persons of ordinary skills in the art at

the time of the applicant's invention to recognize the use of a "busy/idle" status signal is

well known in the art and commonly adopted to facilitate communications between the

source and destination entities of a data transfer pair, as demonstrated by Lo et al.,

hence lacking patentable significance.

Allowable Subject Matter

7.   Claim 10 is objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

8.   *Related Prior Art of Record*

The following list of prior art is considered to be pertinent to applicant's invention,

but not relied upon for claim analysis conducted above.

- Takeda et al., (US Patent Application Publication 2004/0172509), "Data

   Processing System Including Storage Systems."

- Edsall et al., (US Patent Application Publication 2003/0172149), "Methods and

   Apparatus for Implementing Virtualization of Storage within a Storage Area

   Network."

- Mogi et al., (US Patent Application Publication 2003/0093439), "Methods and

   Apparatus for Relocating Data Related to Database Management System."

- Mogi et al., (US Patent Application Publication 2003/0229645), "Data Mapping

    Management Apparatus."

Conclusion

9.   Claims 1-9 and 11-26 are rejected as explained above.

Claim 10 is objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

10.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Shew-Fen Lin whose telephone number is 571-272-

2672. The examiner can normally be reached on 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hosian Alam can be reached on 571-272-3978. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Shew-Fen Lin
Examiner
Art Unit 2166

June 6, 2006

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